1097-35-103 **Mathew A. Johnson*** (matjohn@math.ku.edu), Department of Mathematics, 405 Snow Hall, 1460 Jayhawk Blvd., Lawrence, KS 66045. *Modulational Instability in the Whitham Equation for Water Waves.*

In Whitham's 1974 book, he introduced a model equation for the unidirectional propagation of finite-depth surface water water waves with small amplitude. This model is completely fake, in the sense that it is not derived from any known water wave model. Rather, it is constructed by combining the full unidirectional linear dispersion relation coming from the Euler equations with a canonical shallow water nonlinearity. Whitham formally demonstrated that the resulting pseudo-differential equation, which has affectionately been termed "Whitham's equation", describes many short-wave phenomena present in the full Euler system which are outside the scope of the commonly studied "long-wave" theories (like KdV and Boussinesq theories), such as breaking. In this talk, I will discuss recent joint work with Vera Mikyoung Hur (Urbana-Champaign) in which we demonstrate that the Whitham equation contains enough information from the full Euler equations to bear out the famous Benjamin-Feir instability of Stokes waves. That is, we demonstrate that small-amplitude periodic traveling wave solutions of Whitham's equation are modulationally unstable provided their wavelength is sufficiently large, and are spectrally stable otherwise. (Received January 14, 2014)